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James Preisig

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Applied Ocean Physics and Engineering Dept.
Woods Hole Oceanographic Institution
86 Water Street, MS #12
Woods Hole, MA 02543

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14. ABSTRACT

The Surface Processes and Acoustic Communications Experiment (SPACE07) was planned for the Air-Sea Interaction Tower (ASIT) which is part of WHOI's Martha's Vineyard Coastal Observatory (MVCO) in October 2007. This grant was originally planned to fund much of the work needed to prepare for, deploy, and recover the experiment. Due to legal issues that arose at ONR just days before the start of the experiment, the planned experiment was cancelled, equipment was demobilized and two subsequent experiments were planned and executed (RACE08 and SPACE08) in March and October 2008, respectively. This grant supported the engineering time required to execute these experiments, the acquisition, set up, and management of a large data server to distribute the huge volume of collected data to investigators at 18 different research groups, and prepare, deploy, and analyze the data from a broadband vertical backscatter sonar and adv turbulence array that were central to characterizing the small scale oceanography and surface conditions throughout the experiment. The experiments were very successful and have provided data sufficient to support several years of scientific and engineering research and development.

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Support for the SPACE07 Experiment

Dr. James Preisig
Department of Applied Ocean Physics and Engineering, MS 11
Woods Hole Oceanographic Institution
phone: 508-289-2736, email: jpreisig@whoi.edu

Abstract

The Surface Processes and Acoustic Communications Experiment (SPACE07) was planned for the Air-Sea Interaction Tower (ASIT) which is part of WHOI's Martha's Vineyard Coastal Observatory (MVCO) in October 2007. This grant was originally planned to fund much of the work needed to prepare for, deploy, and recover the experiment. Due to legal issues that arose at ONR just days before the start of the experiment, the planned experiment was cancelled, equipment was demobilized and two subsequent experiments were planned and executed (RACE08 and SPACE08) in March and October 2008, respectively. This grant supported the engineering time required to execute these experiments, the acquisition, set up, and management of a large data server to distribute the huge volume of collected data to investigators at 18 different research groups, and prepare, deploy, and analyze the data from a broadband vertical backscatter sonar and adv turbulence array that were central to characterizing the small scale oceanography and surface conditions throughout the experiment. The experiments were very successful and have provided data sufficient to support several years of scientific and engineering research and development.

Results

The SPACE series of experiments combined simultaneous high resolution measurement of ocean parameters with transmission of high frequency acoustic communications signals through the environmental measurement area. The objective was to gather the data necessary to investigate upper ocean processes such as turbulence and the formation and evolution of bubble clouds as well as the impact of such processes on high frequency acoustic propagation and the performance of underwater acoustic communications systems. In addition, the experiments were designed to gather significant data resulting from the transmission and reception of acoustic communications signals to support the development and analysis of acoustic communications algorithms for both the transmission of signals and the processing of received signals.

This grant supported the engineering work necessary to develop the acoustic transmission and reception equipment for these experiments as well as the logistical planning and execution of the experiments. The engineering work included equipment design and fabrication, preparation for deployment and support during the experiments.

The data gathered is needed by 18 research groups around the United States to support their research. This grant also supported the acquisition, setup, and initial management of a high capacity data server that has functioned flawlessly since the first data from the RACE experiment was made available in April 2008.

Finally, this grant supported the preparation, deployment, and subsequent analysis of the data from a broadband vertical backscatter sonar and an ADV array. These instruments have supplied our primary data regarding the surface wave conditions during the experiment and the turbulence present in the water column. This data is being used by other investigators in the participating research programs to compare oceanographic conditions with observed acoustic propagation phenomena and the performance of acoustic communications systems. The research using data from this experiment is expected to continue for at least the next three to four years resulting in significant advances in the field.